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Some Features of Providing Communications  
in the Far North

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Severe climatic conditions, rocky, mountainous terrain, difficult of access, with a large number of hillocks, lakes, and marshes, the unpopulated nature of the territory and a poorly developed road network in the Far North, create exceptionally great difficulties for troop combat operations and for providing them with communications.

Often, here, because of natural conditions and features of the terrain, the distances between control points of troop formations and large units reach 500 km. Although formerly, when the speed of the troop advance was relatively slow, the construction of permanent overhead communication wires was attended by very great difficulties; today, with the modern speed of troop advance, and in addition, when operating under conditions when atomic weapons are being employed, this often becomes impossible and even unnecessary.

In an offensive in the Far North it is more than ever advisable to lay long-distance communication field cable (PKDS - polevoy kabel' dal'ney svyazi) from a cross-country vehicle. It is impossible to reject wire communications completely under the conditions of the Far North.

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Short-wave and especially ultra short-wave radio communications and radio relay communications do not always work here with the same reliability.

In the Arctic, frequent ionospheric disturbances (magnetic storms, northern lights) have a strong influence on radio communications, and, in most cases lead to their serious disruption or even to a complete stoppage. In particular, this applies to radio communications set up with space waves (with waves being emitted into the zenith). As far as duration is concerned, these disruptions may last from several hours to several days.

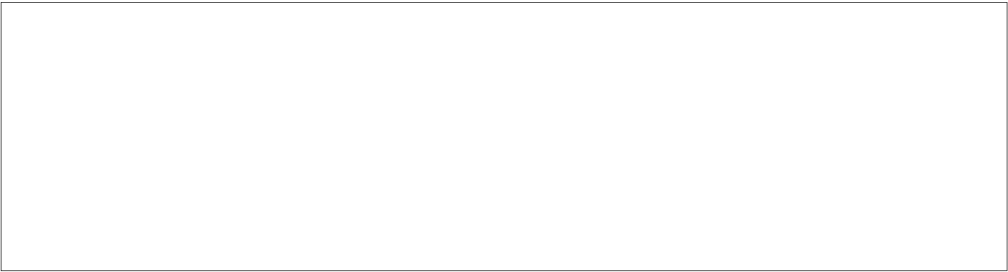
Radio communication carried out by surface emission waves (above the surface of the earth) is less subject to the negative influence of ionospheric disturbances. However, frozen and rocky, mountainous ground, which has, as is well known, low electrical conductivity, and large forest tracts significantly reduce the range of operation of radio sets.

Many years' experience in providing communications for various exercises shows that the range of radio communications achieved with the standard short-wave radio set in the conditions of the Far North, even without a disturbed ionosphere, is reduced by 30 percent in comparison with the range given in the performance data.

Is there a possibility of providing the command and staffs with guaranteed uninterrupted radio and radio relay communications? It is impossible to give an absolutely exact answer to this question, but it is possible to assert that even under the difficult conditions of the Far North it is always possible to find a solution.

To ensure reliable radio communication, it is necessary to organize communications with one and the same formation (large unit) with radio sets that have short-wave and ultra short-wave bands. We also widely apply well-known methods of relaying radio transmissions. So, on various

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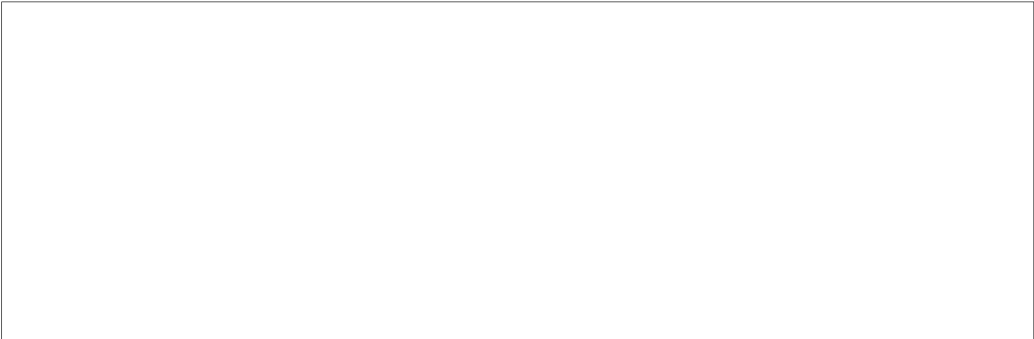


exercises, mobile and stationary relaying radio points and transducing (perepriemnyy) radio sets are widely used by us for communications with units which have moved far forward during an offensive, and especially by those carrying out a wide enveloping movement (under the conditions of the Far North this maneuver is used very often), and also when pursuing the enemy. We set up mobile relay points at the city relaying network (gorodskaya translyatsionnyy set--GTS) or in the armored carrier BTR-50 PU, installing one R-104 and two R-105 radio sets in each of them.

Under the conditions of the Far North, radio relay communications are to some extent free from many shortcomings inherent in radio and wire communications. By means of radio relay lines it is possible, in comparatively short periods of time, to provide stable multichannel telephone and telegraph communications over long distances.

However, the rugged, rocky, mountainous terrain of the Arctic is most unsuitable for the construction of radio relay lines. If this is done, then the intervals between intermediate stations are, as a rule, considerably less than under normal circumstances (by 40 to 45 percent). Under these conditions the outlay of radio relay stations and maintenance personnel is sometimes very great, and besides that, it becomes more difficult to maneuver with radio relay sets. Under normal conditions an independent radio relay battalion (otdelnyy radioreleynnyy batalon--ORRB), with an establishment of nine R-400 sets and twelve R-402 sets, can provide communication on a route extending 800 to 1000 km, but in northern areas it would cover not more than 400 to 500 km.

Good results in providing radio relay communications can be obtained if the sets are deployed on commanding heights and do not keep to the directions of roads. Steep slopes, a large number of boulders, forest, and marshy ground, however, make the disposition of sets on them impossible by any means of transport. The most effective means of transport



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which ensures the delivery of sets onto heights are helicopters.

We conducted an experimental exercise on purpose at which was posed the problem of organizing radio relay communications with the installation of stations on commanding heights by means of helicopters on a route extending 220 km. It was intended to deploy five R-401 sets in all - two terminal ones and three intermediate stations (the last ones had to be deployed on heights where normal ground transport could not deliver them). The heights were located 50 to 75 km from each other.

The delivery, by an MI-4 helicopter, of a radio relay apparatus for one station, which had been taken from special vehicles and packed in boxes (785 to 800 kg total weight), and of the crew, took one and a half hours. Six hours were used to deliver three sets. The time spent in loading, transporting, deploying of radio relay stations, and establishing communications along the whole line was about 9.5 hours. If we had 4 helicopters at our disposal then a radio relay line extending 220 km could be put into operation in 4 hours. The communications were excellent.

Helicopters can be used successfully, and 4 or 5 helicopter sorties will be required to deliver a dismantled R-402 set.

As experience shows, communications by means of heavy radio relay stations in Arctic conditions are reliable. In all, we needed three radio relay stations to provide communications on a route extending 115 kms (only one station was established). If one considers that radio relay stations should be established on commanding heights (and this is most advisable), then there must be two or three flights of helicopters at the disposal of the commanding officer of signal troops of a formation operating in northern regions, for constructing radio relay lines.

The commanding officer for communications of a large unit and a formation has to show special concern about communications during movement. The trouble is that the distances between control points under conditions in the Arctic are, as a rule, two to three times greater than

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under temperate zone conditions, and there are no radio sets which could provide direct communications for 200 km or more. That is why we make broad use of the relaying of short-wave radio communications and of coupled working of ultra short-wave sets with radio relay stations.

At the command staff exercise in 1959 and the joint tactical and special exercise of district signal units held in March 1960, radio communications during movement were provided in the following manner. The R-118 radio set was used at front forward command posts for communicating with army and corps forward command posts. Because it provided reliable telephone and telegraph communication during movement for only 25 km, its transmissions were radio relayed by means of the R-102 radio set, deployed 20 to 25 km from the forward command post. At the same time, reception of radio transmissions from the users (from armies and corps) was effected by a direct link (200 to 500 km). But in this instance the users had to transmit with short pauses.

At the front forward command post, it is better to have two R-102 radio sets which, because they can be moved about, provide uninterrupted radio relay.

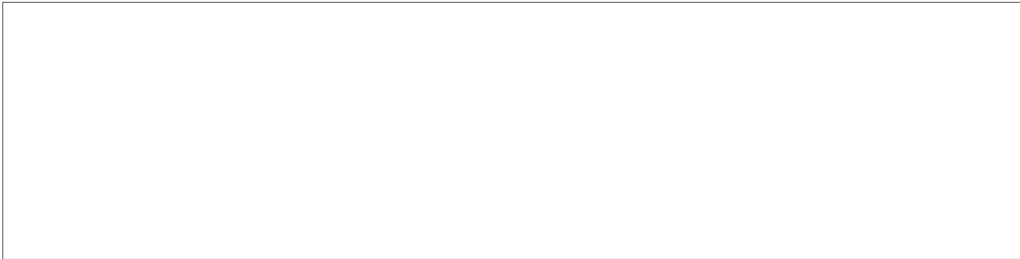
Another method of providing communications during movement is the coupled working of radio and radio relay stations. The essence of this method is that the R-105 radio set (with a power amplifying unit) is in the vehicle of the commanding officer and has an outlet into the radio relay route. The resulting effect is not bad. It should be noted, however, that our switching at the radio relay stations, being done by hand, took much time. The problem of automatic switching into the radio relay link by ultra short-wave sets must be solved. But for this it is necessary that one of the channels along the whole of the radio relay route should be free.

We would like to say a few words about providing communications in the event of the delivery of a strike by the forces and weapons of missile troops, covering troops, and aviation.

It is known that all forces and weapons which have been brought in for this purpose must receive, simultaneously and quickly, a warning about the preparation to deliver a strike and an order for its delivery. In our opinion, it is only

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possible to carry out such a requirement when a special single front short-wave radio network has been created. Radio receivers of army headquarters and of all front and army large units which are called upon to deliver the strike must be included in it.

Such a radio network is set up only for the period of preparation and delivery of the strike. However, taking into account the conditions of the Far North which were discussed in the beginning of the article, it is necessary to have several similar networks, not for the whole front but for individual operational axes.

To avoid loss of radio communications on the short-wave band when there are ionospheric disturbances, it is necessary to transmit (duplicate) the order for the strike on the medium-wave front radio network. It should be organized to include radio receivers of control points of the army, corps, and also front missile brigades, the fleet, and the army PVO.



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